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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,925	01/24/2002	Masateru Tadakuma	FURUK.003AUS	4007

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EXAMINER

SONG, SARAH U

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 10/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/056,925

Applicant(s)

TADAKUMA ET AL.

Examiner

Sarah Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5. 6) ☐ Other: .

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The prior art documents submitted by the applicant in the Information Disclosure Statement filed on October 18, 2002 have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

3. This application has been filed with eighteen (18) sheets of drawings, which have been approved by the Examiner.

Claim Objections

4. Claim 1 and 36 are objected to because of the following informalities: Examiner suggests insertion of ~~counter-propagating~~ after "magnitude" in line 5 of claim 1 to provide proper antecedent basis for "said counter-propagating pulses" in line 7; device claim 36 is objected to as depending from method claim 35, and Examiner suggests amending claim 36 to read, "The method of claim 35" since it further recites method steps. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

ADD 6. Claims 1, 2, 4-7, 8-10, 12, 14-22, 23, 25, 27, 29-34 and ~~37~~³⁵⁻³⁸ are rejected under 35

U.S.C. 102(b) as being anticipated by Toda et al. (*OPTICAL SOLITON TRANSMISSION IN A COMB-LIKE DISPERSION PROFILED FIBER LOOP*). Toda et al. discloses an

optical pulse shaper comprising a CDPF having end portions coupled so as to form an optical loop mirror. The optical pulse shaper additionally comprises an optical amplifier (EDFA3, EDFA4) and a polarization controller (PC) located within the CDPF optic loop. Toda et al. discloses an additional polarization controller (PC) optically coupled to the input of said optical mirror to regulate the polarization state of optical pulses input into said optical mirror. Toda et al. further discloses a chirp compensation fiber (DCF) optically connected to the output port of the optical fiber coupler.

7. More specifically, Toda et al. discloses, in Figure 3, a device for producing optical pulses comprising an optical mirror comprising an input port, an output port, and a fiber optic loop having two ends, said input port optically connected to both ends of said fiber optic loop such that an optical pulse input into said input port is split into two lesser magnitude counter-propagating optical pulses which propagate in opposite directions through said fiber optic loop (inherent), said output port also optically connected to said ends of said fiber optic loop so as to receive optical energy from both said counter-propagating pulses (inherent), wherein said fiber optic loop comprises a comb-like dispersion profiled fiber (CDPF) having three or more sections (e.g. 8 sections, see page 319, 3rd paragraph) characterized by changes in dispersion and arranged to compress said pulses propagating therethrough (inherent), said sections having lengths such that said counter-propagating pulses are phase-shifted with respect to each other so

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as to optically interfere with each other to prevent noise associated with said optical pulses from being output from said output port. Figures 4a and 4b show the reduced noise output of the device of Figure 3, as compared to Figures 5a and 5b of a conventional device.

8. Regarding claims 2 and 4-6, Figures 1a and 1b disclose the sections of the CDPF increasing in length from one end of said fiber loop to the other end of the fiber loop, and comprising 8 sections delimited by changes in dispersion.

9. Regarding claim 7, Toda et al. does not explicitly disclose repeated compression of the optical pulse propagating through the device. However, the repeated compression is an inherent feature of CDPFs due to the alternating segments of high dispersion and low dispersion fiber.

10. Regarding claims 14-17 and 20, Toda et al. additionally discloses a four-way optical coupler having four ports (AOM2), said coupler defining a path from the input port to two side ports, and from each of the two side ports to an output port. The optical path connecting the side ports comprises separate portions having different lengths and alternating dispersive and nonlinear characteristics (see Figure 1a and 1b). The coupler separates out lower intensity noise components from peak signal components associated with said pulses as shown in Figure 4. The optical path comprises alternating sections (dispersion shifted fiber) imparting stronger nonlinear effects and sections (single mode fiber) that introduce more dispersion. Toda et al. discloses 4 or more sections. Repeated compression of the optical pulse is an inherent feature of CDPFs due to the alternating segments of high dispersion and low dispersion fiber. It is additionally noted that the optical pulse is inherently repeatedly chirped by the alternating nonlinear sections

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11. Regarding claims 22, 23, 25 and 27, Toda et al. additionally discloses a pulsed laser light source (DFB-LD), an optical path including plurality of pairs of dispersive and nonlinear optical sections as noted above in Paragraph 10, said pairs having different lengths and arranged to provide asymmetry such that counter-propagating pulses experience different amounts of phase shift with respect to each other (inherent), wherein said phase shift causes interference between said counter-propagating pulses combined within the coupler, said interference resulting in separation of low intensity noise from said compressed pulses as shown in Figure 4. The light source comprises a modulator for producing pulsed waveforms (page 320, 2nd paragraph). Toda et al. additionally discloses an amplifier EDFA2 positioned to amplify light prior to coupling into said optical coupler, polarization controllers PC to set the polarization of said light input into said coupler.

12. Regarding claims 18, 19 and 38, it is noted that the nonlinear sections constitute the means for repeatedly chirping the first and second optical pulses, the dispersive sections constitute the means of delaying the first and second optical pulses to reduce the pulse width, the counter-propagation paths through the loop constitutes the means of introducing different amounts of phase shift and delay in the first and second pulses, and the optical loop coupler constitutes the means for interfering said first and second optical pulses to separate out high intensity components associated with a peak and low intensity components associated with said noise.

13. Regarding claims 31-37, the method steps are inherent as setting forth requisite steps for operation and manufacture of the device of Toda et al.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. **Claims 3, 11 and 26 rejected under 35 U.S.C. 103(a) as being unpatentable over**

Toda et al. Toda et al. does not specifically disclose said sections having a length between about 0.3 and about 200 meters. It would have been within the level of ordinary skill in the art to determine section lengths of between about 0.3 and 200 meters since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

16. Toda et al. also does not specifically disclose the CDPF comprising a polarization maintaining fiber. A polarization maintaining fiber would have been obvious since it is known in the art that a polarization maintaining fiber would have been functionally equivalent to the disclosed fiber having a polarization controller.

17. Toda et al. does not specifically disclose an isolator. Isolators are well known in the art for preventing feedback to an optical source such as a laser diode. Therefore, it would have been obvious to one having ordinary skill in the art to provide an isolator between the light source and the coupler of Toda et al. to prevent unwanted feedback to the light source.

18. **Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toda et al. as applied to claim 22 above, and further in view of Chernikov et al., provided by the applicant (*Experimental demonstration of step-like dispersion profiling in optical fibre for***

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soliton pulse generation and compression). Toda et al. does not specifically disclose a light source comprising a plurality of optical sources having different wavelengths that are combined to produce a modulated light beam. Chernikov et al. discloses a light source comprising a plurality of optical sources having different wavelengths that are combined to produce a modulated light beam. It would have been obvious to one having ordinary skill in the art to modify the light source of Toda et al. to comprise the light source of Chernikov et al. since the two light sources are art recognized equivalents for producing pulsed light and it appears that the invention would perform equally well regardless of the specific type of light source.

19. **Claims 13 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toda et al. as applied to claim 22 above, and further in view of Chernikov et al. (*Comblake dispersion-profiled fiber for soliton pulse train generation*).** Toda et al. does not specifically disclose a CDPF optically coupled to said input of said optical mirror such that optical pulses are compressed prior to input into said optical mirror. Chernikov et al. discloses CDPF coupled after an optical source for compressing optical pulses. One of ordinary skill in the art would have found it obvious to provide the CDPF coupled between the optical source and the optical mirror of Toda et al. to provide precompressed pulses to the optical mirror. One of ordinary skill in the art would have been motivated to provide a CDPF prior to input of the optical mirror to enhance the pulse compression and shaping achieved by the device of Toda et al.

Conclusion

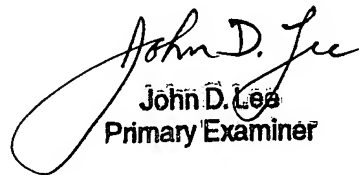
20. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

21. Any inquiry concerning the merits of this communication should be directed to Examiner Sarah Song at telephone number 703-306-5799. Any inquiry of a general or clerical nature, or relating to the status of this application or proceeding should be directed to the receptionist at telephone number 703-308-0956 or to the technical support staff supervisor at telephone number 703-308-3072.


sus


John D. Lee
Primary Examiner